

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application of:	)	METHOD OF MAKING A POWER
	)	TRANSMISSION BELT/BELT SLEEVE
HIROTAKA HARA ET AL	)	AND BELT/BELT SLEEVE MADE
	)	ACCORDING TO THE METHOD
	)	
Ser. No.: Unassigned	)	Group Art Unit: Unassigned
	)	
Filed: Herewith	)	Examiner: Unassigned


INFORMATION DISCLOSURE STATEMENT

Commissioner of Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450  
Sir:

Applicant wishes to call the Examiner's attention to the art listed on the attached form PTO-1449. A copy of each reference is attached.

It is believed that the claims pending in the above application are allowable over the cited references. An early and favorable action on the merits is respectfully requested.

Respectfully submitted,

  
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Date: 6/30/03

FORM PTO-1449  
(REV. 7-80)

U.S. DEPARTMENT OF COMMERCE  
PATENT AND TRADEMARK OFFICE

ATTY DOCKET NO.  
00650-0741US

SERIAL NO.

LIST OF PRIOR ART CITED BY APPLICANT  
(Use several sheets if necessary)

APPLICANT: Hirotaka Hara

FILING DATE  
Herewith

GROUP

U.S. PATENT DOCUMENTS

EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
	AA	5,904,630	5/99	Berthelier			
	AB	6,045,735	4/00	Berthelier			
	AC						
	AD						
	AE						
	AF						
	AG						
	AH						
	AI						
	AJ						
	AK						

FOREIGN PATENT DOCUMENTS

		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION	
							YES	NO
	AL	JP-UM-B-27946	1982	Japan				
	AM	JP-A-40087	1978	Japan				
	AN	JP-A-25948	1983	Japan				
	AO	JP-A-86236	1998	Japan				
	AP							

OTHER PRIOR ART (Including Author, Title, Date, Pertinent Pages, Etc.)

	AQ		
	AR		
	AS		

EXAMINER

DATE CONSIDERED

EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

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Japanese Patent No.2708717 Publication

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CLAIMS

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(57) [Claim(s)]

[Claim 1] It is V ribbed belt characterized by being V ribbed belt in which two or more V ribs prolonged in a belt longitudinal direction to a belt machine band are formed, and for the above-mentioned V rib carrying out the grinding of the rib front face of V rib section in which consisted of a staple-fiber compound, and corresponded to the above-mentioned V rib, and preforming was carried out to the larger configuration a little than the above-mentioned V rib by extrusion molding, and forming it.

[Claim 2] V ribbed belt according to claim 1 whose rate of orientation of the belt cross direction orientation of the staple fiber is carried out in a belt longitudinal direction, the belt cross direction, and the belt vertical direction in V rib, and is 30% or more.

[Claim 3] The manufacture method of V ribbed belt which manufactures V ribbed belt which is characterized by providing the following, and in which two or more V ribs prolonged in a belt longitudinal direction to a belt machine band are formed using the staple-fiber compound. The 1st process which carries out extrusion molding of the cylinder-like rib rubber tube which has V rib section which corresponds to the above-mentioned V rib and, by which orientation was carried out to the circumferential direction, and preforming of the staple fiber was carried out to the larger configuration a little than the above-mentioned V rib with the extruder which equips an outlet portion with the extended die which has V rib section fabrication slot in the periphery section or the inner circumference section. the above-mentioned cylinder-like rib rubber tube -- using -- vulcanization -- the 2nd process which fabricates V ribbed belt Plastic solid to metal mold, and is vulcanized The 3rd process which carries out the grinding of the rib front face of V rib section of V ribbed belt Plastic solid after vulcanization, and forms V rib.

[Claim 4] the 2nd process -- a cylinder-like rib rubber tube -- the direction of a tube axis -- meeting -- cutting it open -- as a rib rubber sheet -- this rib rubber sheet -- using -- vulcanization -- the manufacture method of V ribbed belt according to claim 3 which fabricates V ribbed belt Plastic solid to metal mold

[Claim 5] A rib rubber sheet is the manufacture method of V ribbed belt according to claim 4 which the heights of the above-mentioned cover sheet are made to fit into the slot between V rib sections, and is rolled round using the cover sheet which has the heights of the configuration corresponding to the slot between V rib sections formed in the rib rubber sheet in advance of fabrication of V ribbed belt Plastic solid in the 2nd process.

[Claim 6] It is the manufacture method of V ribbed belt according to claim 3 which this rubber form sheet is twisted so that the slot between the heights of a rubber-die sheet may engage with a rib rubber sheet in the 2nd process at the rib section, vulcanization is performed, and the slot between the heights of the above-mentioned rubber-die sheet is the same pitch as V rib of V ribbed belt, and serves as small capacity from V rib.

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**DETAILED DESCRIPTION**

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[Detailed Description of the Invention]

[0001]

[Industrial Application] this invention relates to V ribbed belt in which two or more V ribs prolonged in a belt longitudinal direction to a belt machine band are formed, and its manufacture method.

[0002]

[Description of the Prior Art] V ribbed belt in which two or more V ribs prolonged in a belt longitudinal direction to a belt machine band as a belt for power transfer are formed conventionally is known. And generally manufacture of such a V ribbed belt is performed as follows (refer to drawing 17).

[0003] \*\* Knead the rubber with which the staple fiber was blended with a kneading machine a.

[0004] \*\* Roll out the kneaded rubber b in Calender c, and Conveyer e takes it over as a rubber sheet d. At this time, as for the thickness of a rubber sheet d, orientation of the staple fiber is carried out to a longitudinal direction by about 0.6-1.0mm.

[0005] \*\* Lay a rubber sheet d on top of thickness required for fabrication, and obtain the rubber sheet of predetermined thickness.

[0006] \*\* A rubber sheet is cut in the direction which intersects perpendicularly to a longitudinal direction, and form the piece f of rubber, and --, and connect this piece f of rubber, and -- in the longitudinal side, and consider as a rubber sheet g. Orientation of the staple fiber will be carried out crosswise by this.

[0007] \*\* fabrication -- metal mold -- stick the rubber sheet g which attached belt materials other than a rubber sheet to h, and was obtained by \*\* on it, cut to required length, and carry out the butt joint of the edge

[0008] \*\* Load a vulcanizer and carry out vulcanization fabrication.

[0009] \*\* fabrication -- remove the moldings [ finishing / vulcanization ] m from metal mold h

[0010] \*\* Bottom rubber section m1 Grinding is carried out and it is begun to delete V rib configuration. The grinding waste produced at this time is discarded.

[0011] \*\* Cut according to the number of required rib mountains, and obtain V ribbed belt.

[0012]

[Problem(s) to be Solved by the Invention] However, according to the method mentioned above, in order to form V rib configuration, the present condition is carrying out the grinding of the bottom rubber section, and the grinding loss of the bottom rubber section by the grinding increasing (about 30% [ Specifically ] of the bottom rubber section), and having become cost quantity.

[0013] Moreover, extrusion molding of the plate-like rubber plate is carried out, the after [ vulcanization ] grinding of it is carried out, and how to form V rib is also learned so that it may be indicated by JP,1-303338,A, for example.

[0014] However, such a V ribbed belt has the inclination which seldom changes with the method by the calender mentioned above, and base rubber contracts in the direction of orientation of a staple fiber after grinding at a point with a grinding loss. It is thought that the inclination contracted in the direction of orientation of a staple fiber arises here because the contraction suppression function by the staple fiber is lost, since a staple fiber will be cut in case it begins to shave V rib by grinding, although it is suppressed

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with the staple fiber that the rubber after vulcanization tends to contract.

[0015] this invention reduces the grinding loss about the bottom rubber section, and offers V ribbed belt aiming at the cost cut, and its manufacture method.

[0016]

[Means for Solving the Problem] Invention which requires invention concerning a claim 1 · a claim 2 for V ribbed belt, and relates to a claim 3 · a claim 6 relates to the manufacture method of the V ribbed belt.

[0017] Invention concerning a claim 1 and a claim 2 is premised on V ribbed belt in which two or more V ribs prolonged in a belt longitudinal direction to a belt machine band are formed.

[0018] Invention concerning a claim 1 considers the rib front face of V rib section in which the above-mentioned V rib consisted of a staple-fiber compound, corresponded to the above-mentioned V rib, and preforming was carried out to the larger configuration a little than the above-mentioned V rib by extrusion molding as the composition formed by carrying out grinding. And in the above-mentioned V rib, orientation of the staple fiber is carried out in a belt longitudinal direction, the belt cross direction, and the belt vertical direction, and the rate of orientation of the belt cross direction of invention concerning a claim 2 is 30% or more.

[0019] Invention concerning a claim 3 · a claim 6 is premised on the manufacture method of V ribbed belt that two or more V ribs prolonged in a belt longitudinal direction to a belt machine band are formed, using a staple-fiber compound.

[0020] Invention concerning a claim 3 with the extruder which equips an outlet portion with the extended die which has V rib section fabrication slot The 1st process which carries out extrusion molding of the cylinder-like rib rubber tube which has V rib section which corresponds to the above-mentioned V rib and, by which orientation was carried out to the circumferencial direction, and preforming of the staple fiber was carried out to the larger configuration a little than the above-mentioned V rib in the periphery section or the inner circumference section, the above-mentioned cylinder-like rib rubber tube -- using -- vulcanization -- it considers as the composition possessing the 2nd process which fabricates V ribbed belt Plastic solid to metal mold, and is vulcanized, and the 3rd process which carries out the grinding of the rib front face of V rib section of V ribbed belt Plastic solid after vulcanization, and forms V rib

[0021] invention concerning a claim 4 -- setting -- the 2nd process -- a cylinder-like rib rubber tube -- the direction of a tube axis -- meeting -- cutting it open -- as a rib rubber sheet -- this rib rubber sheet -- using -- vulcanization -- V ribbed belt Plastic solid is fabricated to metal mold

[0022] In advance of fabrication of V ribbed belt Plastic solid, using the cover sheet which has the heights of the configuration corresponding to the slot between V rib sections formed in the rib rubber sheet, a rib rubber sheet makes the heights of the above-mentioned cover sheet fit into the slot between V rib sections, and is rolled round in the 2nd process in invention concerning a claim 5.

[0023] In invention concerning a claim 6, in the 2nd process, this rubber form sheet is twisted, vulcanization is performed so that the slot between the heights of a rubber-die sheet may engage with a rib rubber sheet at the rib section, and the slot between the heights of the above-mentioned rubber-die sheet is the same pitch as V rib of V ribbed belt, and serves as small capacity from V rib.

[0024]

[Function] According to invention concerning a claim 1, by carrying out the grinding of the side of V rib section in which corresponded to V rib and preforming was carried out to the larger configuration a little than V rib by extrusion molding, V rib is formed and a grinding loss decreases.

[0025] According to invention concerning a claim 2, in V rib, a staple fiber has, orientation is carried out crosswise [ belt ] at 30% or more of rate of orientation, and desired lateral-pressure-proof nature is obtained.

[0026] According to invention concerning a claim 3, with the extruder which equips an outlet portion with the extended die which has V rib section fabrication slot in the 1st process Extrusion molding of the cylinder-like rib rubber tube which has V rib section which corresponds to the above-mentioned V rib and, by which orientation was carried out to the circumferencial direction, and preforming of the staple fiber was carried out to the larger configuration a little than the above-mentioned V rib in the periphery section or the inner circumference section is carried out, and it sets at the 2nd process. the above-mentioned cylinder-like rib rubber tube -- using -- vulcanization -- V ribbed belt Plastic solid is fabricated to metal mold, it vulcanizes, and the grinding of the rib front face of V rib section of V ribbed belt Plastic solid after vulcanization is carried out in the 3rd process, and V rib is formed

[0027] according to invention concerning a claim 4, in the 2nd process, the cylinder-like rib rubber tube extruded through the outlet portion of an extended die is cut open along the direction of a tube axis, and a staple fiber considers as the plate-like rib rubber sheet by which orientation was carried out to the longitudinal direction -- having -- this -- using -- vulcanization -- V ribbed belt Plastic solid is fabricated to metal mold

[0028] In the 2nd process, in advance of fabrication of V ribbed belt Plastic solid, the rib rubber sheet cut open makes the heights of a cover sheet fit into the slot between V rib

sections, and, according to invention concerning a claim 5, is rolled round with this cover sheet.

[0029] according to invention concerning a claim 6 -- the 2nd process -- setting -- vulcanization -- metal mold -- this rubber form sheet is prepared in V rib section of the rib rubber sheet fabricated upwards so that the slot between the heights of the rubber-die sheet with which the slot between heights serves as capacity smaller than V rib in the same pitch as V rib of V ribbed belt may be engaged, and vulcanization is performed in it

[0030]

[Example] Hereafter, the example of this invention is explained in detail along with a drawing.

[0031] In drawing 1 which shows the outline composition of V ribbed belt, 1 is V ribbed belt generally used as a belt for power transmission, and two or more V ribs 3 and -- which are prolonged in a belt longitudinal direction to the belt machine band 2 are formed. The above-mentioned V rib 3 consists of a staple-fiber compound to which orientation of the staple fiber was carried out crosswise [ belt ], carries out the grinding of the rib front face (the rib side and rib base) of the above-mentioned V rib 3 and V rib section in which corresponded to -- and preforming was carried out to the above-mentioned V rib 3 and the larger configuration a little than -- by extrusion molding, and is formed so that it may mention later.

[0032] And in the V above-mentioned ribs 3 each, orientation of staple-fiber 3b and -- is carried out in a belt longitudinal direction, the belt cross direction, and the belt vertical direction in three dimensions into rubber 3a, among those the rate of orientation of the staple fiber in the belt cross direction has become 30% or more.

[0033] In addition, in drawing 1 , 4 is a top sail-cloth layer, 5 is a tension-member code layer, and tension-member code 5b is spirally laid underground into adhesion rubber 5a.

[0034] Then, how to manufacture the above-mentioned V ribbed belt 1 is explained along with drawing 2 .

[0035] The extended die 12 (refer to drawing 3 and drawing 4 ) with which it has outside die 12a and inner die 12b into the outlet portion of an extruder 11, and V rib section fabrication slot 12c was first formed in it regularly at the circumferencial direction at inner die 12b is attached. <the 1st process> -- Extrusion molding of the cylinder-like rib rubber tube 13 which has V rib section 13a by which orientation was carried out to the circumferencial direction, it corresponded to the inner circumference section at the above-mentioned V rib 3 and --, and preforming of the staple fiber was carried out to the above-mentioned V rib 3 and the larger configuration a little than -- by the extended die

12 with the extruder 11, and -- is carried out (refer to drawing 5 ).

[0036] By the way, in order to carry out orientation of the staple fiber to a circumferencial direction with the extended die 12, it is the entrance portion P1 of the extended die 12. Main diameter R1 of the center of 12d of rubber passage Outlet portion P2 of the extended die 12 Main diameter R2 of the center of 12d of rubber passage It is required for a ratio to be 6.5 or more. That is, it is required to materialize the following formula.

[0037]

[Equation 1]

$$\frac{R2}{R1} > 6.5$$

And as for the staple-fiber compound extruded by the extruder 11, orientation of the staple fiber is carried out to a circumferencial direction by extended operation of the extended die 12 by the relation of the above-mentioned formula being materialized.

[0038] By the way, outlet portion P2 of 12d of rubber passage of the extended die 12 Although V rib section fabrication slot 12c for performing mold attachment of V rib (preforming) is formed It is only the outlet portion P2 of 12d of rubber passage of the extended die 12 about V rib section fabrication slot 12c. The orientation of the staple fiber by which orientation should be carried out to a circumferencial direction in the cylinder-like rib rubber tube extruded from the extended die 12 only by preparing is not only confused, but it is accompanied by the following faults.

[0039] (i) It becomes the resistance at the time of V rib section fabrication slot 12c being extrusion molding, the orientation of the circumferencial direction of a staple fiber is barred, and an extended operation is barred.

[0040] (ii) Since it becomes the resistance at the time of V rib section fabrication slot 12c being extrusion molding and productivity is reduced, although it is necessary to extrude in order to prevent it and to heighten a pressure, if it is made such, the force with an extruder 11 or the extended die 12 impossible for will act.

[0041] (iii) Manufacture is difficult, and becomes expensive and management of the extended die 12 which has V rib section fabrication slot 12c is also troublesome.

[0042] Then, in order to cancel this fault, in consideration of the appearance of a cylinder-like rib rubber tube and change (the die swell and fiber orientation) which are extruded by the configuration of V rib of the bottom rubber section of V ribbed belt, the length of the direction of rubber passage of V rib section fabrication slot, and the extended die, the extended die was manufactured as follows.

[0043] (a) Set up the slot pitch of the circumferencial direction of V rib section fabrication slot 12c so that it may agree with V rib pitch of the V ribbed belt 1 which is a finished product or may become small a little from it. Here, when becoming small a little from V rib pitch, in such a case, it is because the roll with which V rib pitch and the slot pitch of the V ribbed belt 1 which is a finished product agreed can be passed at once and V rib pitch can be made to agree at the time of fabrication, and has included because the variation in a certain amount of V rib pitch can be permitted, if it does in this way.

[0044] (b) Set up more greatly than the rib angle of the V ribbed belt 1 which is a finished product the degree of forming gash angle of V rib section fabrication slot 12c. It is for lessening the mold flow at the time of vulcanization, and making it the orientation of a staple fiber not confused.

[0045] (c) the thickness of V ribbed belt -- vulcanization -- make it thicker than the design size in metal mold The cross section of the extruded rib rubber tube is because it is in the inclination which contracts and becomes small.

[0046] (d) Although the orientation of a circumferencial direction is confused by preparing V rib section fabrication slot 12c in the extended die 12, the orientation of the staple fiber in the extruded cylinder-like rib rubber tube is short in the length of the direction of rubber passage of V rib section fabrication slot 12c, and can adopt how to be confused very small by making height low.

[0047] An example of the size about the extended die used for fabricating V ribbed belt and it is shown concretely. In drawing 6 and drawing 7 In addition,  $L1 = 3.50\text{mm}$ ,  $L2 = 2.20\text{mm}$ ,  $L3 = 1.75\text{mm}$ , rib angle  $\theta_1 = 50$  degree,  $L_{11} = 3.56\text{mm}$ ,  $L$  -- they are  $L2 = 2.52\text{mm}$   $L13 = 2.28\text{mm}$   $L14 = 3.36\text{mm}$   $L15 = 1.49\text{mm}$   $L16 = 5.30\text{mm}$   $L17 = 3.0\text{mm}$   $R11 = 0.7\text{mm}$   $R12 = 0.2\text{mm}$  and degree  $\theta$  of gash angle  $\theta_{11} = 40$  degree In drawing 7, F is a direction where rubber flows.

[0048] The rate of orientation of the staple fiber of manufactured V ribbed belt became as it is shown in the next table 1 using the above-mentioned extended die. In addition, the orientation of a staple fiber makes what has the highest rate of orientation the direction of X, makes it below the direction of Y, and a Z direction one by one, and is doubled and shown also about what is depended on the conventional calender with the above-mentioned example of this invention (conventional example), and the thing (example of comparison) using a plate-like extrusion sheet.

[0049]

[Table 1]

配向方向	従来例	比較例	本発明例
X方向	95%以上	90～60%	80～33.5%
Y方向	4	30～6	40～30
Z方向	1	15～4	25～4
合計	100	100	100

Although V rib section fabrication slot 12c is formed in inner die 12b of the extended dies, it replaces with it and you may make it form V rib section fabrication slot 12e in the inner circumference section of outside die 12a in the above-mentioned example, as shown in drawing 8 and drawing 9. If it does in this way, V rib section 18a and -- will be fabricated by the periphery section of the cylinder-like rib rubber tube 18 (refer to drawing 10).

[0050] By the way, it is necessary to double the arrangement pitch (for example, L1=3.50mm) of V rib section 14b of the rib rubber sheet 14 with V rib pitch (for example, L11=3.56mm) of the V ribbed belt 1 which is a finished product. although grinding will be carried out by the final process although this is the same also in the following vulcanization, and desired V rib will be formed, if the pitch has shifted -- nice -- fabrication -- it is because problems, like cannot equip metal mold but V rib carries out form collapse will arise

[0051] therefore, vulcanization -- before sticking on metal mold 15, between the iron roller whose arrangement pitch of V rib slot is 3.56mm about the rib rubber sheet 14, and flat rollers is passed, and it is made to double V rib section 14b of the rib rubber sheet 14, and the arrangement pitch of -- with V rib pitch (3.56mm) of the V ribbed belt 1

[0052] The cylinder-like rib rubber tube 13 extruded through the outlet portion of the <2nd process> extension die 12 is cut open in the direction of a tube axis, and it considers as the plate-like rib rubber sheet 14.

[0053] Specifically, the cylinder-like rib rubber tube 13 extruded from the extended die 12 is introduced into the outside of the double cylinder pipe 31, as shown in drawing 11. The double cylinder pipe 31 is supported so that it may be located in a predetermined position through the supporter material 32 and 32. It comes to arrange the air pipe 34 in the center of the cylinder part material 33 of the outside of the double cylinder pipe 31. Air blows off through air port 33a by which the air supplied through this air pipe 34 was formed in the outside side of the outside cylinder part material 33, and --. The cylinder-like rib rubber tube 13 sends in the state of suspension to the double cylinder

pipe 31, and it is conveyed by conveyer 35, and is taken over by the taking over conveyer 36. In case it is taken over by the taking over conveyer 36, with the receptacle roller 37 and the incision round-tooth roll 38 which were formed in the supporter material 32 and 32 of the double cylinder pipe 31, the cylinder-like rubber tube 13 is cleared in the length direction, and it is constituted so that it may become the rib rubber sheet 14. In addition, in the outlet portion of the extended die 12, the extrusion speed of the cylinder-like rib rubber tube 13 is detected, it sends synchronizing with it, and a conveyer 35 and the taking over conveyer 36 drive.

[0054] In this rib rubber sheet 14, orientation of the staple-fiber 14a is carried out in the direction where V rib 14b by which preforming was carried out is prolonged, and the direction which intersects perpendicularly.

[0055] by the way, the cleared rib rubber sheet 14 -- vulcanization -- although it is necessary to once roll round in advance of fabrication of V ribbed belt Plastic solid to metal mold and it can be performed by well-known field winding, since the rib rubber sheet 14 has not been vulcanized, when it is rolled round and goes, it deforms by self-weight or has the fault of adhering between each class of a sheet therefore, V rib section 14b formed in the rib rubber sheet 14 as shown in drawing 12 and drawing 13 and -- deformation of the rib rubber sheet 14 can be prevented by making heights 21a of the configuration corresponding to slot 14c of a between, these heights 21a of the cover sheet 21 (being the so-called -- suiting -- cloth or a polyester sheet) which has --, and -- fit into V rib section 14b and slot 14c between --, and rolling them round

[0056] and cylinder-like vulcanization -- the belt material (specifically, as shown in drawing 14 , they are the tooth-back sail cloth 22, the adhesion rubber sheet 23, the tension-member code 24, and the adhesion rubber sheet 25) except the rib rubber sheet 14 is attached to metal mold 15 in order, the rib rubber sheet 14 cut by required length on them is twisted after that, and it considers as V ribbed belt Plastic solid 16 (un-vulcanizing) At this time, the cut cross section of the thickness direction of a rubber sheet is made into 30-45 degrees, and heightens the joint effect by matching combination.

[0057] In addition, \*\* which considers as matching joint as it is fabricated by the method of not giving a tension to the rib rubber sheet 14 as much as possible at the time of fabrication, and it is cut by required length by the forming golden draw spike, sticking the rib rubber sheet 14 and the cut side of the thickness direction becomes 30-40 degrees, and heightens the joint effect.

[0058] vulcanization -- where V ribbed belt Plastic solid 16 is fabricated on metal mold 15, as shown in drawing 14 , heights 26a of the rubber-die sheet 26 is fitted into slot 14c

of the rib rubber sheet 14 -- making -- this rubber-die sheet 26 -- the rib rubber sheet 14 -- twisting -- it -- like common knowledge -- a vulcanizer (not shown) -- loading -- heating -- pressurization -- vulcanization fabrication -- carrying out -- after that and vulcanization -- the moldings 17 which vulcanization ended is removed from metal mold 15 Since it is begun to shave the rib rubber sheet 14 the grinding after vulcanization at the last configuration and is made to expose a staple fiber from a rib front face, the crevice formed between heights 26a of the rubber-die sheet 26 and 26a is formed so that it may become large by the volume corresponding to a part for grinding rather than V rib (refer to drawing 14 two-dot chain line) of V ribbed belt which is a finished product.

[0059] In addition, the above-mentioned rubber-die sheet 26 is fabricated by isobutylene isoprene rubber, and the heights 26a is manufactured by the configuration corresponding to the slot between V rib section 14b of the rib rubber sheet 14, and --, and it is twisted on the rib rubber sheet after fabrication. Moreover, the isobutylene isoprene rubber to which orientation of the staple fiber was carried out right-angled to the longitudinal direction of a periphery as the base-sheet section of the above-mentioned heights 26a is used to attain stabilization of the rubber-die sheet 26, change of a size was lessened in the array direction (hoop direction) of V rib section, and it considered as the thing of the structure which is easy to be extended to a longitudinal direction. In addition, even if it uses polymer, such as EPT besides isobutylene isoprene rubber, and EPDM, it is checked that a good result is obtained.

[0060] moreover, vulcanization -- it carries out, attaching the rubber-die sheet 26, in order to prevent the deformation and buckling of a belt by the drawing force to the belt applied at the time of mold omission, when extracting the moldings which vulcanization ended from metal mold

[0061] In addition, as the vulcanization method, it is based on the vulcanizer mentioned above, and also can vulcanize by the following method.

[0062] (1) It consists of a cylinder of method 2 shaft by the vulcanizer. a well-known funnel -- on a front face in the configuration of an eye opposite to V rib of a finished product V ribbed belt, and a little small It is the method of vulcanizing, while it has the mold of the same rib pitch, and can change with belt length between 2 shafts, it puts a pressure on one side of two shafts with the steel band belt which hung the forming belt between through and 2 shafts, and became endless from the outside about the heat source for vulcanization, heat is applied from from the outside by the side of the heat source of two shafts and two shafts rotate.

[0063] A fabricated belt is hung between method 2 shafts by the well-known press. (2) Between the belts of two shafts in the configuration of an eye opposite to V rib of a

finished-product V ribbed belt, and a little small The metal mold of the same rib pitch as V rib of a finished-product V ribbed belt is arranged (you may arrange up and down). How to arrange a flat hot platen in the outside of the belt of two shafts, and to put a heat source into metal mold and a hot platen, and to carry out pressurization heating with oil pressure, vulcanize the belt of the portion in contact with the hot platen, and carry out delivery baking (vulcanization) one by one.

[0064] (3) How for the length of the method circumferencial direction by three well-known sprit molds to insert V ribbed belt Plastic solid in a thing with the same mold as a front face according to a mold with the metal mold divided into three, put a cylindrical sealing sleeve from the exterior, and carry out heating vulcanization by differential pressure with a vulcanizer.

[0065] The grinding of V rib section 17a to which preforming of the V rib of the moldings 17 <3rd process> Taken out is carried out, rib surface 17b of --, and -- (the rib side and rib base) is carried out, and it is begun to shave predetermined V rib so that V ribbed belt may have a desired rib configuration. In addition, that V rib configuration begins to delete, as shown in the two-dot chain line A of drawing 1 , it is begun for it not to be restricted, and to delete only the thickness same about each rib front face, and also thickness is changed into drawing 14 like the configuration shown with a two-dot chain line, and it can begin to delete especially.

[0066] If a staple-fiber compound besides for beginning to delete the configuration of V rib of a predetermined configuration is vulcanized, since the phenomenon in which a staple fiber does not appear will produce performing grinding in the front face of a rubber board here, although it is for exposing a staple fiber on a rubber front face, and giving adjustment and abrasion resistance of coefficient of friction Since it has preformed, there are few workloads of grinding sharply compared with the conventional method, and they become saving of the grinding loss of 25 - 30% of bottom rubber from the plate-like bottom rubber sheet vulcanized like the former compared with the case where the grinding of the V rib is carried out.

[0067] After a grinding end, according to the number of V ribs to need, a moldings 17 is cut and desired V ribbed belt is obtained.

[0068] Then, the test result which followed V ribbed belt concerning this invention and the conventional V ribbed belt is shown in the next table 2 and Table 3.

[0069]

[Table 2]

	従来例	本発明例
Vリブ角度	40 °	40 °
Vリブ高さ	2.5 mm	2.5 mm
Vリブピッチ	3.54	3.54
底角R	1.0	1.0
底谷R	0.2	0.2
摩擦係数	0.86	0.93

Coefficient of friction is [ the example of this invention ] larger than the above-mentioned table 2, and a bird clapper is known.

[0070]

[Table 3]

	従 来 例	本 発 明 例
強制摩耗試験	2.5 ~2.8%	2.1 ~2.5%
耐屈曲試験	100Hr	150 ~200hr
耐熱高負荷試験	100Hr	130 ~170hr
高負荷耐久試験	100Hr	140 ~200hr

The result of the above-mentioned examination shown table 3 shows that the example of this invention is excellent to the conventional example about both abrasion resistance flexibility heat-resistant heavy load nature and heavy load endurance.

[0071] Generally by the way, in the case of the V ribbed belt 101 which used calendered sheeting for the bottom rubber (rib rubber) of V ribbed belt If it is the state where applied to the small pulley and it bent, although the phenomenon of V rib 101a and .. in which a nose of cam lenticulates to a longitudinal direction will arise (refer to drawing 16) As mentioned above, when the rib rubber sheet which carries out extrusion molding using an extended die, and becomes is used for the bottom rubber of V ribbed belt It is checked that the V rib 3 and the phenomenon of .. in which a nose of cam lenticulates to a longitudinal direction do not arise as a state bent with the application of the V ribbed belt 1 to the small pulley (refer to drawing 15).

[0072] Since orientation of the staple fiber is carried out to the longitudinal direction in the case of the former, although the force to swell acts, this As opposed to the bending stress being considered to escape to the point of V rib and to wave a point since the operation is barred the latter It is because it is thought that it swells easily in a

longitudinal direction since it is distributing in other directions since the orientation of a staple fiber is not concentrating on \*\* on the other hand like the former.

[0073]

[Effect of the Invention] Since invention concerning a claim 1 was formed by carrying out the grinding of the rib front face of V rib section in which consisted of a staple-fiber compound, and corresponded to the above-mentioned V rib, and preforming was carried out to the larger configuration a little than the above-mentioned V rib by extrusion molding in V rib as mentioned above, it saves a grinding loss and can manufacture it cheaply.

[0074] Invention concerning a claim 2 has a staple fiber at 30% or more of rate of orientation crosswise [ belt ] in V rib, since orientation is carried out, desired lateral-pressure-proof nature is obtained and the outstanding belt property is also acquired.

[0075] Invention concerning a claim 3 with the extruder which equips an outlet portion with the extended die which has V rib section fabrication slot in the 1st process Carry out extrusion molding of the cylinder-like rib rubber tube which has V rib section which corresponds to the above-mentioned V rib and, by which orientation was carried out to the circumferencial direction, and preforming of the staple fiber was carried out to the larger configuration a little than the above-mentioned V rib in the periphery section or the inner circumference section, and it is set at the 2nd process. Fabricate and vulcanize V ribbed belt Plastic solid to metal mold, and it sets at the 3rd process. the above-mentioned cylinder-like rib rubber tube -- using -- vulcanization -- The rib mountain corresponding to a rib can be formed without barring the orientation of a staple fiber in a cylinder-like rib rubber tube, since the grinding of the rib front face of V rib section of V ribbed belt Plastic solid after vulcanization is carried out and it is made to form V rib.

[0076] since it is made to obtain the plate-like rib rubber sheet with which invention concerning a claim 4 cut open the cylinder-like rib rubber tube extruded through the outlet portion of an extended die in the direction of a tube axis, and orientation of the staple fiber was carried out crosswise -- the plate-like rib rubber sheet -- using -- vulcanization -- metal mold -- V ribbed belt Plastic solid can be fabricated simply and easily upwards

[0077] Invention concerning a claim 5 can be carried and conveyed in the 2nd process to the place which fabricates V ribbed belt Plastic solid, without making a rib rubber sheet transform, since the heights of a cover sheet are made to fit into the slot between V rib sections of that and the rib rubber sheet cut open was rolled round with this cover sheet

in advance of fabrication of V ribbed belt Plastic solid.

[0078] invention concerning a claim 6 -- the 2nd process -- setting -- vulcanization -- metal mold -- since this rubber-die sheet is twisted around a rib rubber sheet and it is made to carry out vulcanization fabrication so that the slot between heights may engage the slot between the heights of the rubber-die sheet which is capacity smaller than V rib with V rib section of the rib rubber sheet fabricated upwards in the same pitch as V rib of V ribbed belt, vulcanization fabrication of the V rib configuration can be carried out it is accurate and reasonable

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## DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1] It is the outline block diagram of V ribbed belt.

[Drawing 2] It is explanatory drawing of the manufacture method of V ribbed belt.

[Drawing 3] It is the cross section of an extended die.

[Drawing 4] It is this front view.

[Drawing 5] They are some perspective diagrams of the extruded cylinder-like rib rubber tube.

[Drawing 6] It is the detailed cross section of an extended die.

[Drawing 7] It is the side elevation of an extended die.

[Drawing 8] It is the cross section of the extended die of other examples.

[Drawing 9] It is this front view.

[Drawing 10] They are some perspective diagrams of the extruded cylinder-like rib rubber tube.

[Drawing 11] It is explanatory drawing of the mechanism which uses a cylinder-like rib rubber tube as a rib rubber sheet.

[Drawing 12] It is the perspective diagram of a cover sheet.

[Drawing 13] It is a perspective diagram in the state where the cover sheet was applied to the rib rubber sheet.

[Drawing 14] It is the outline cross section showing the state where the rubber-die sheet was applied in the rib rubber sheet of a vulcanization golden draw spike.

[Drawing 15] It is explanatory drawing of V ribbed belt concerning this invention.

[Drawing 16] It is explanatory drawing of the conventional V ribbed belt.

[Drawing 17] It is explanatory drawing of the manufacture method of conventional V

RIBUDO \*\* RUTO.

[Description of Notations]

1 V Ribbed Belt

2 Belt Machine Band

3 V Rib

11 Extruder

12 Extended Die

12a Inner die

12c Outside die

12c V rib section fabrication slot

13 18 Cylinder-like rib rubber tube

14 Rib Rubber Sheet

14b V rib section

21 Cover Sheet

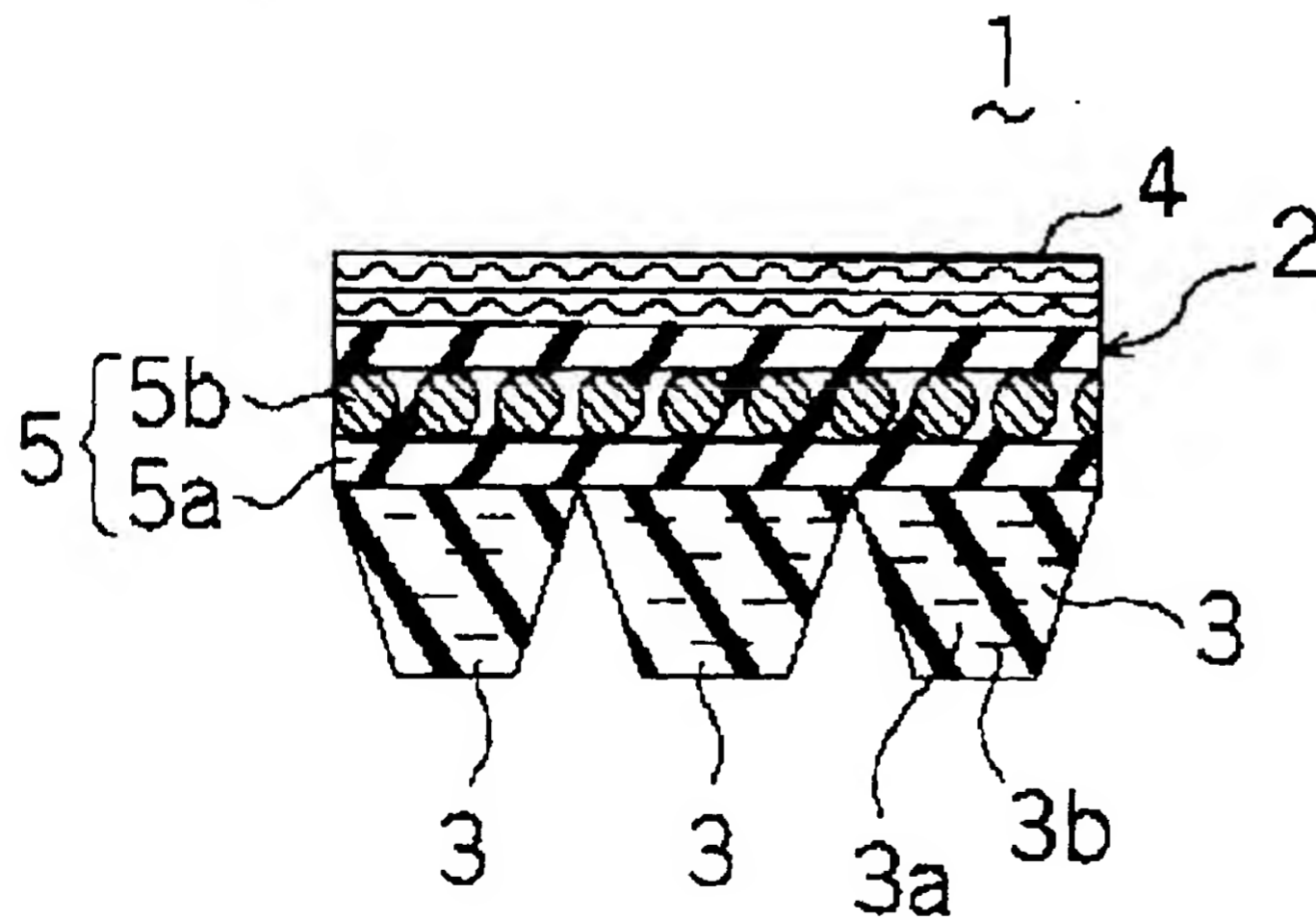
21a Heights

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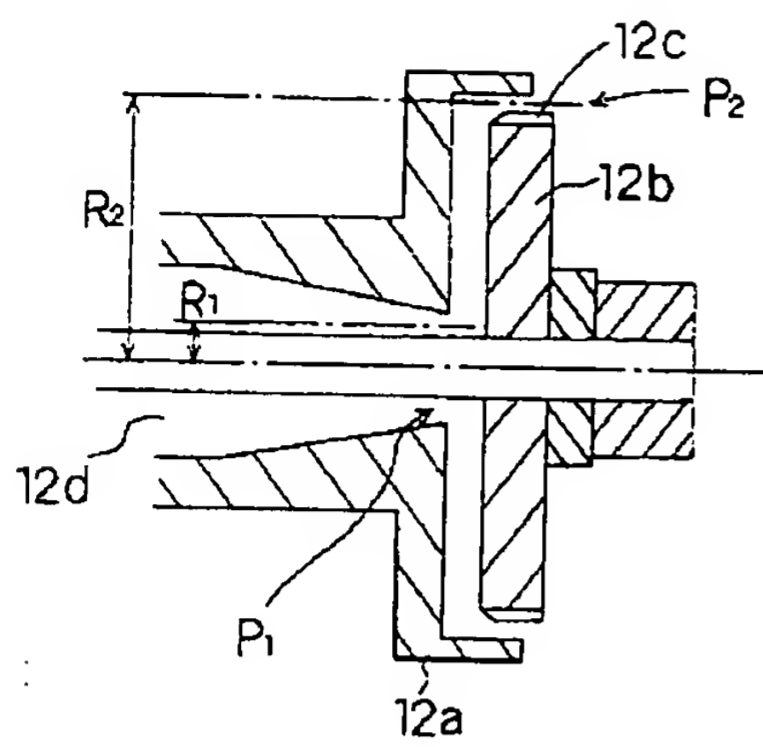
DRAWINGS

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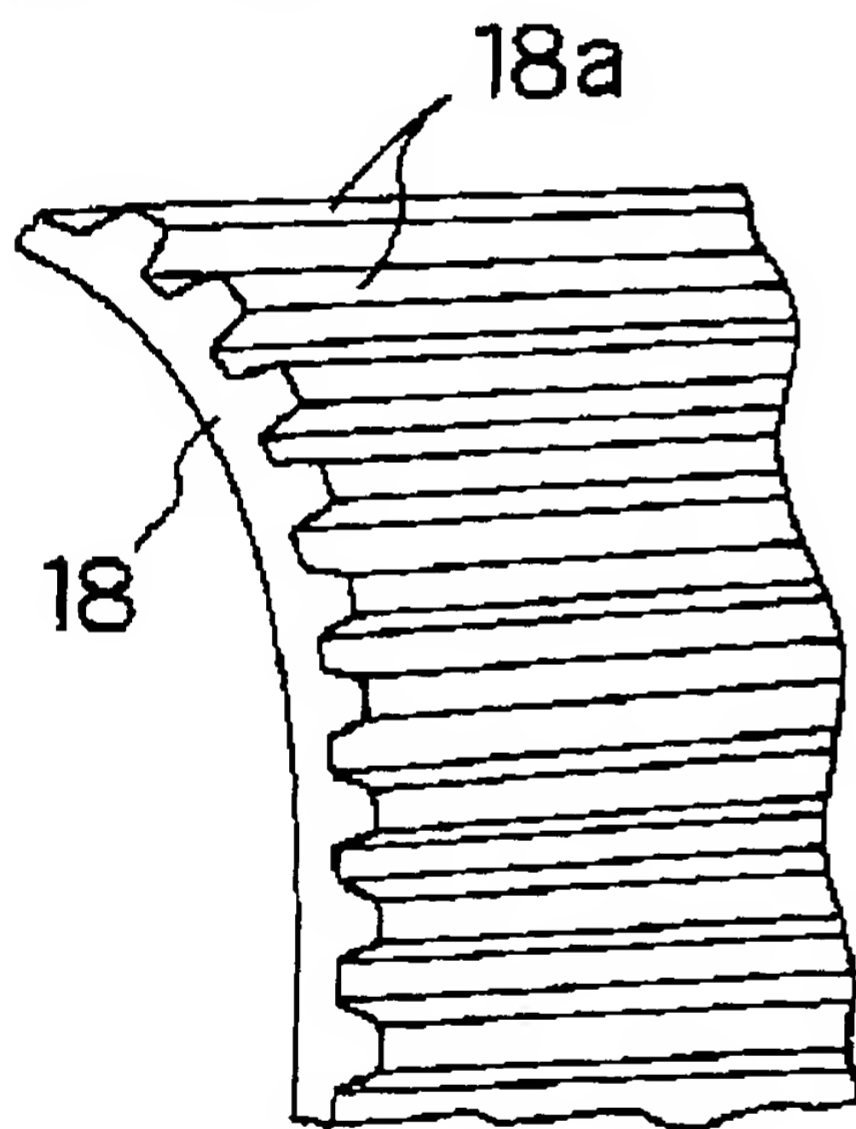
[Drawing 1]



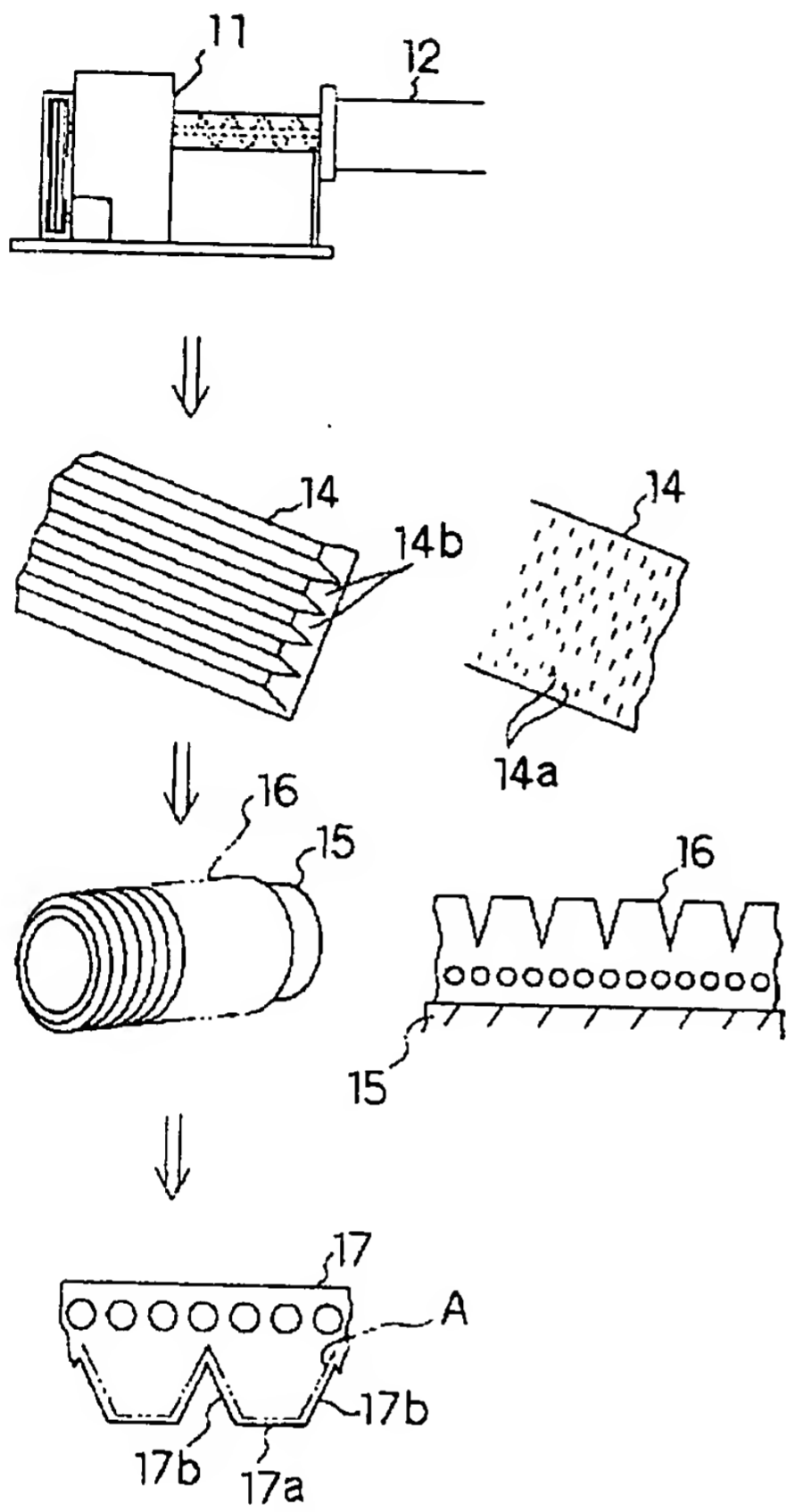
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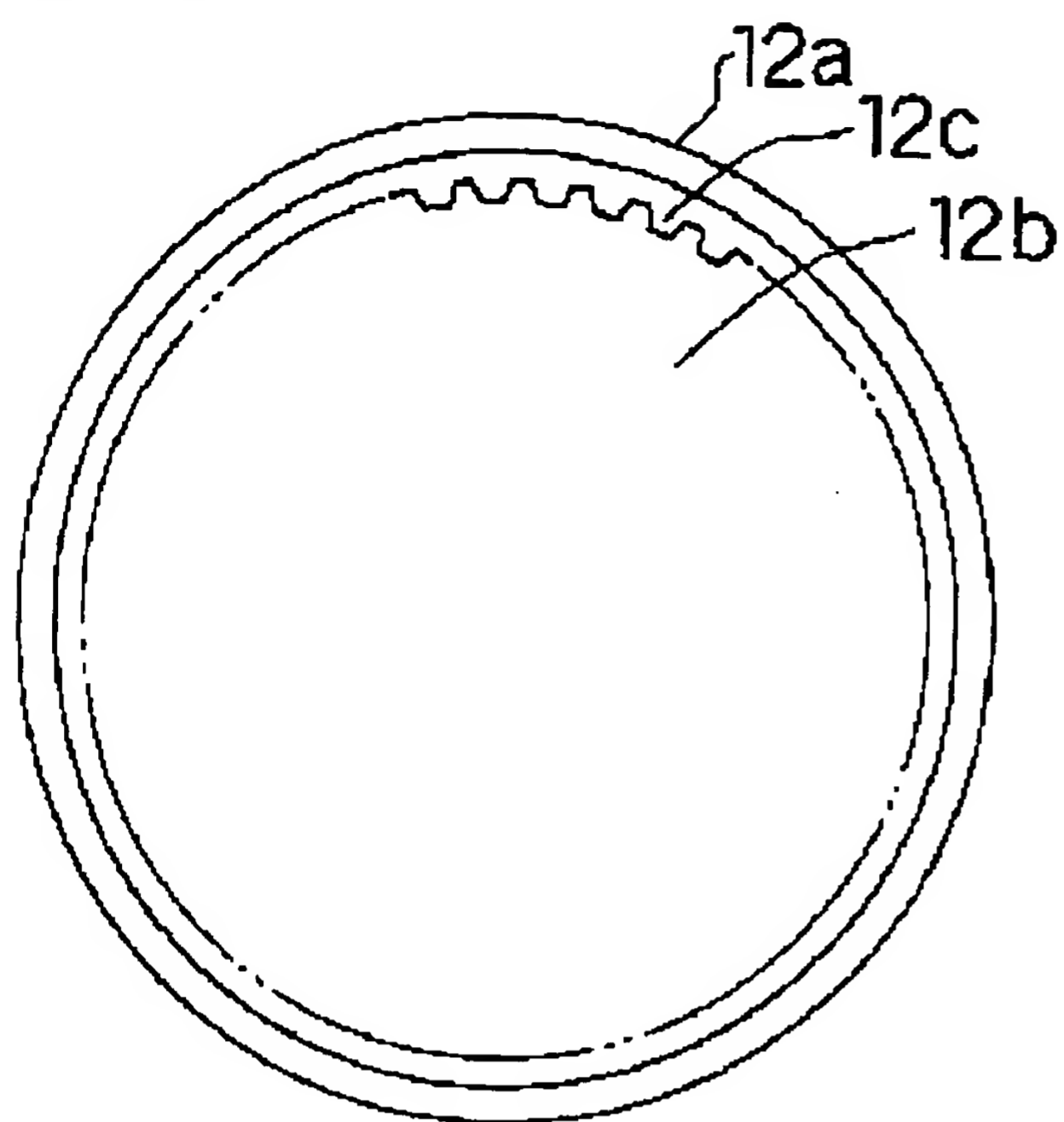
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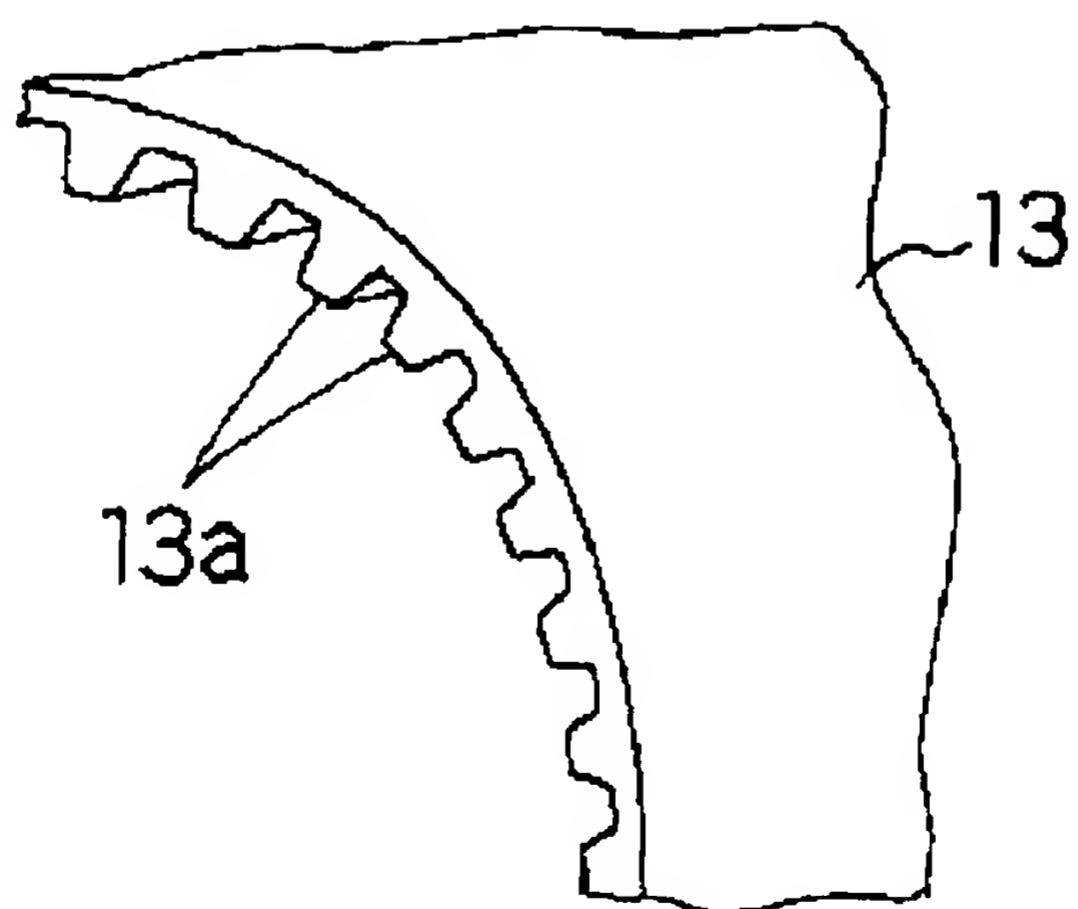
[Drawing 2]



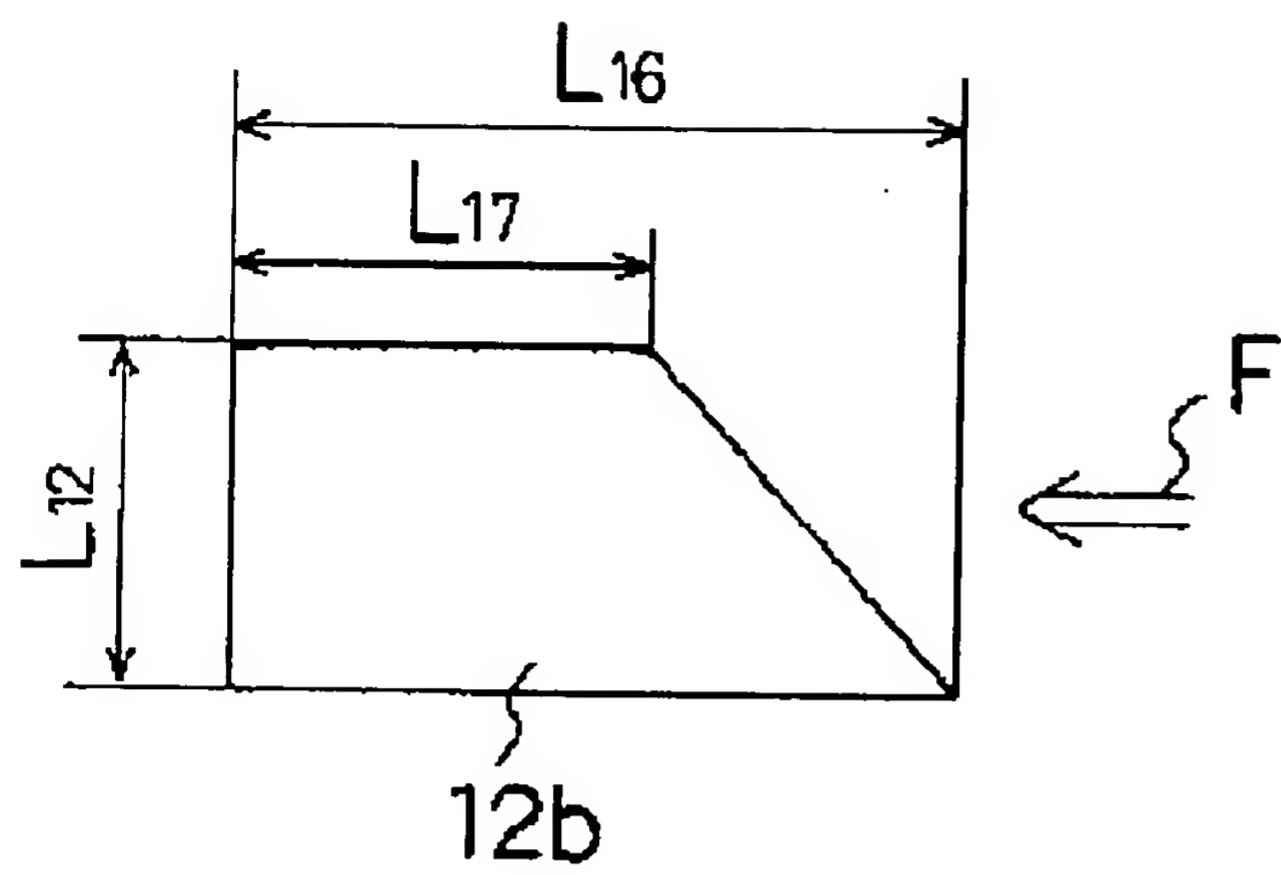
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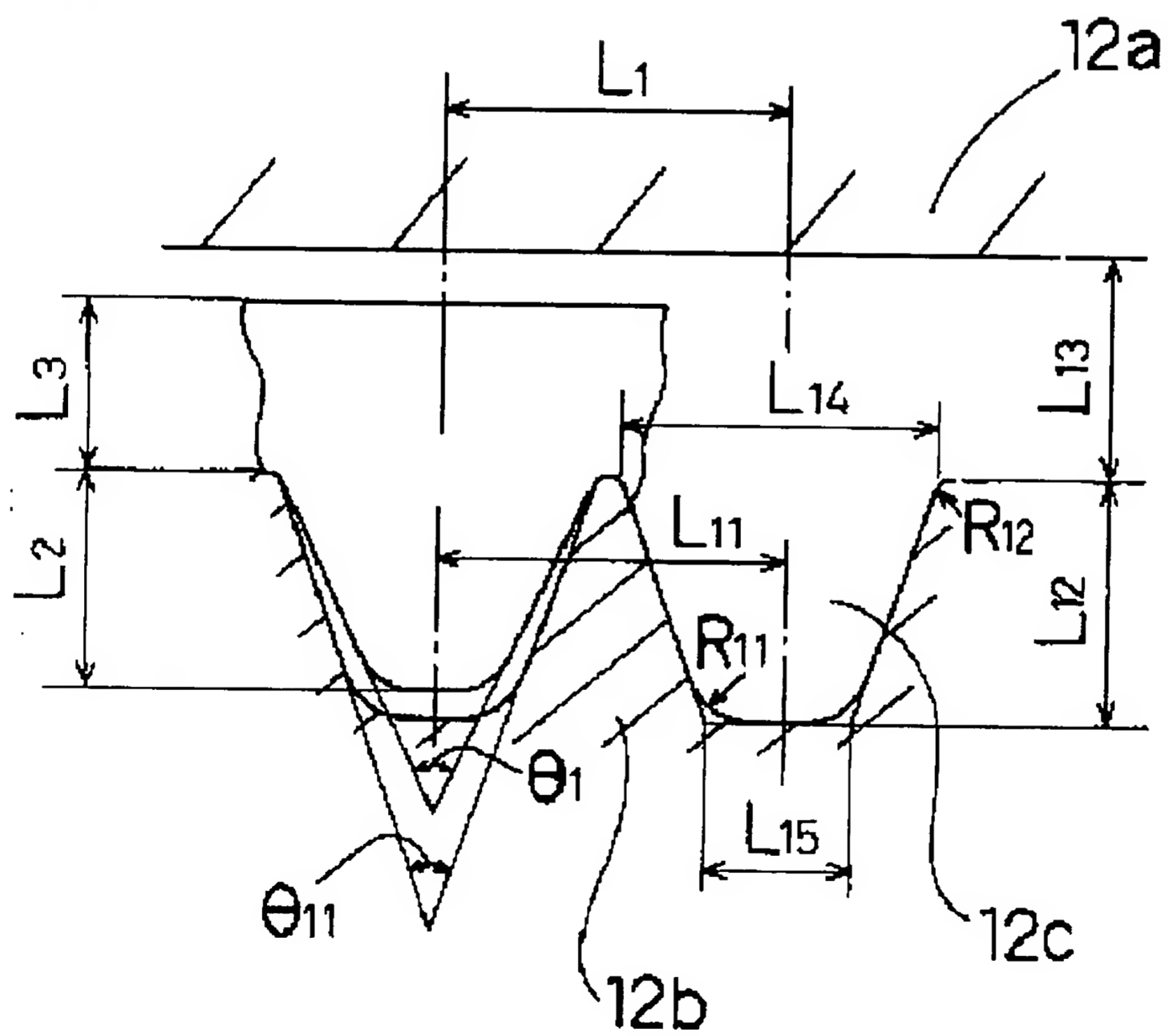
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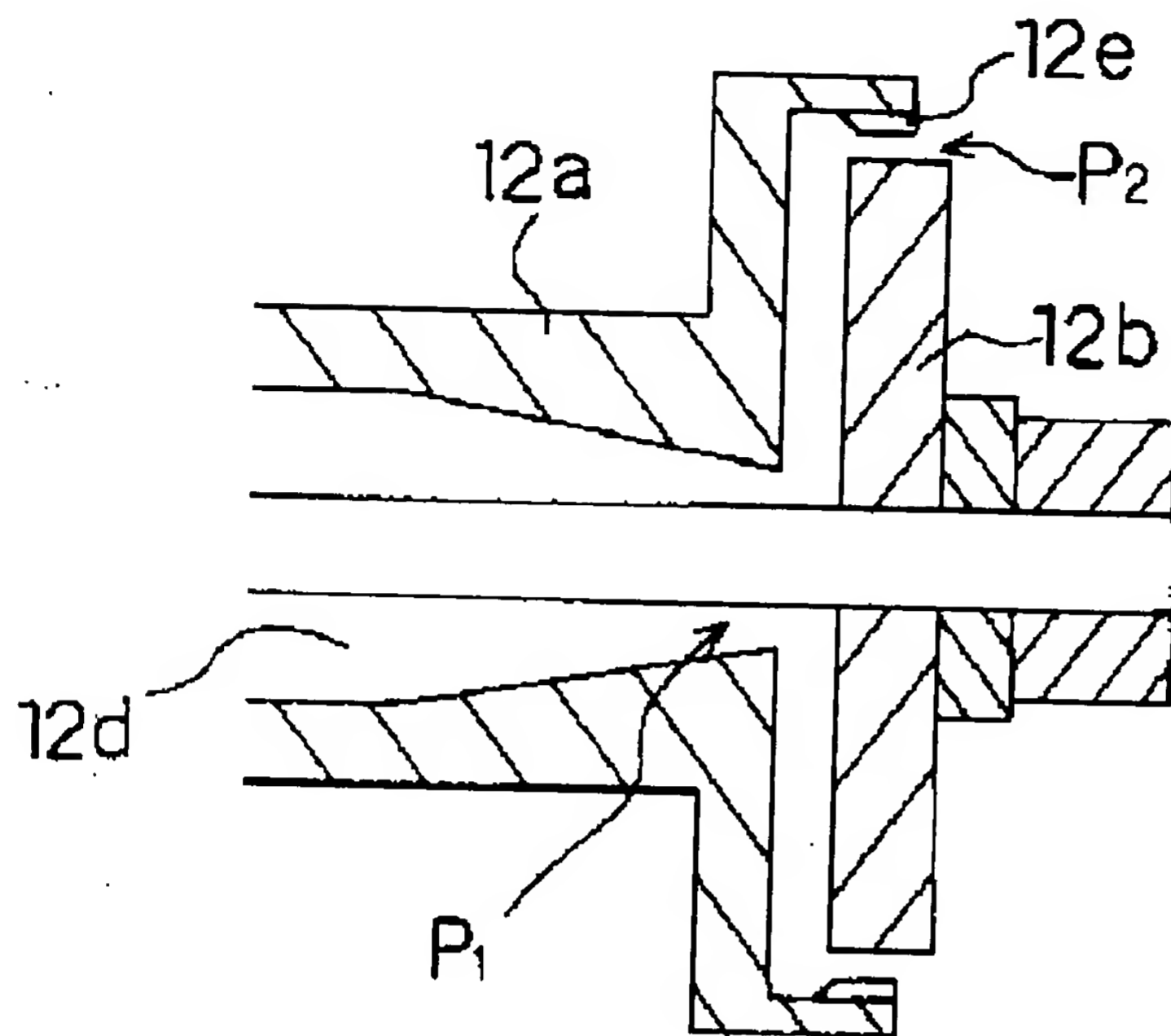
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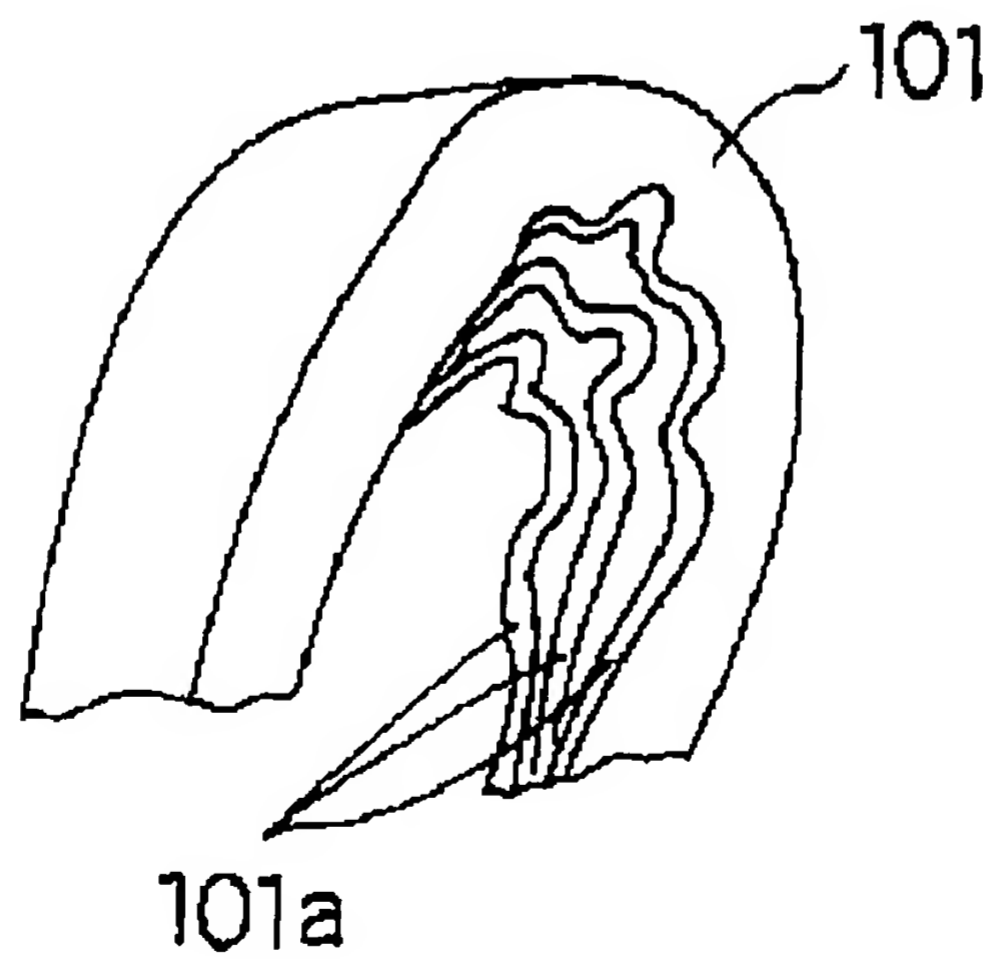
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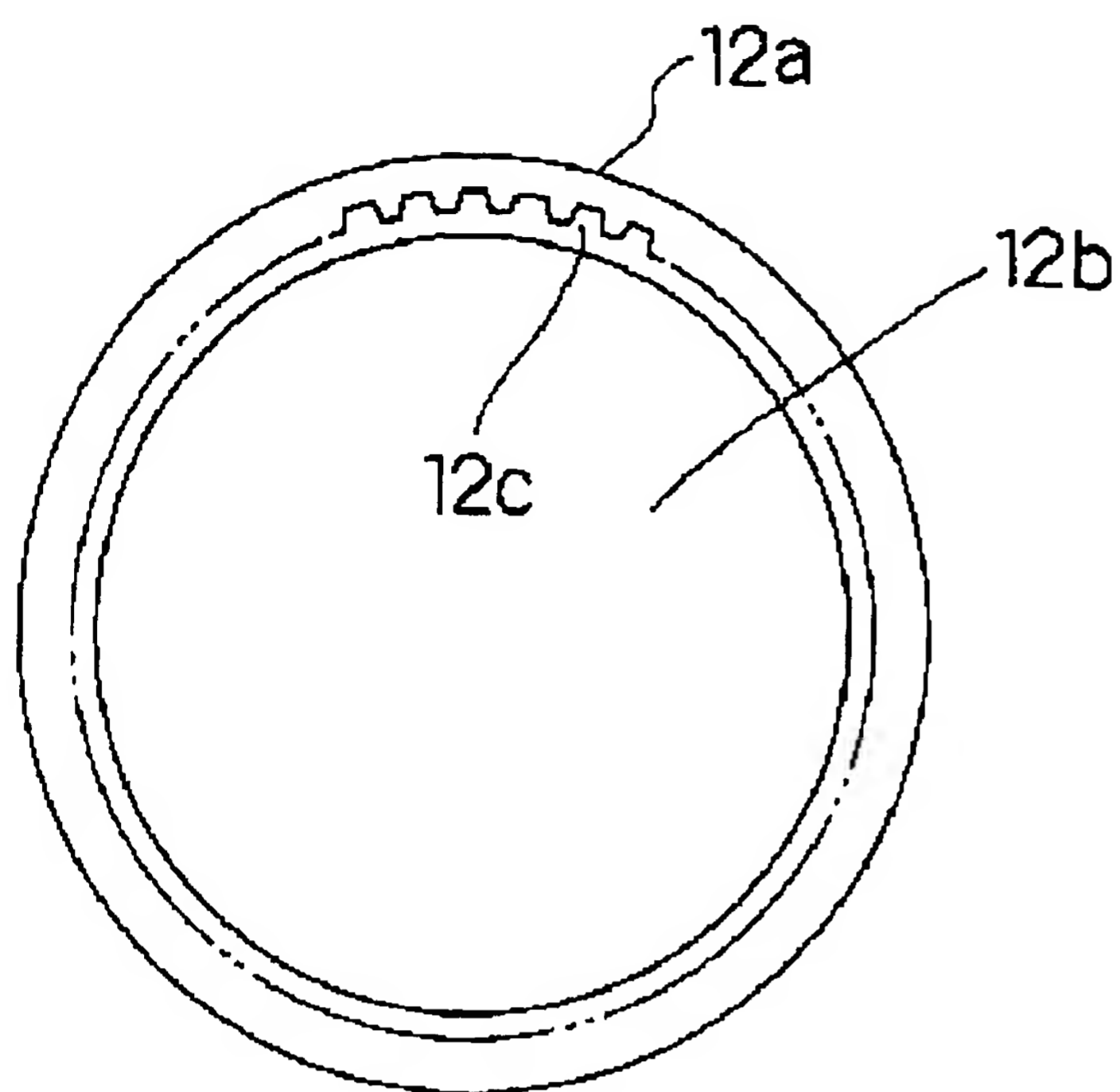
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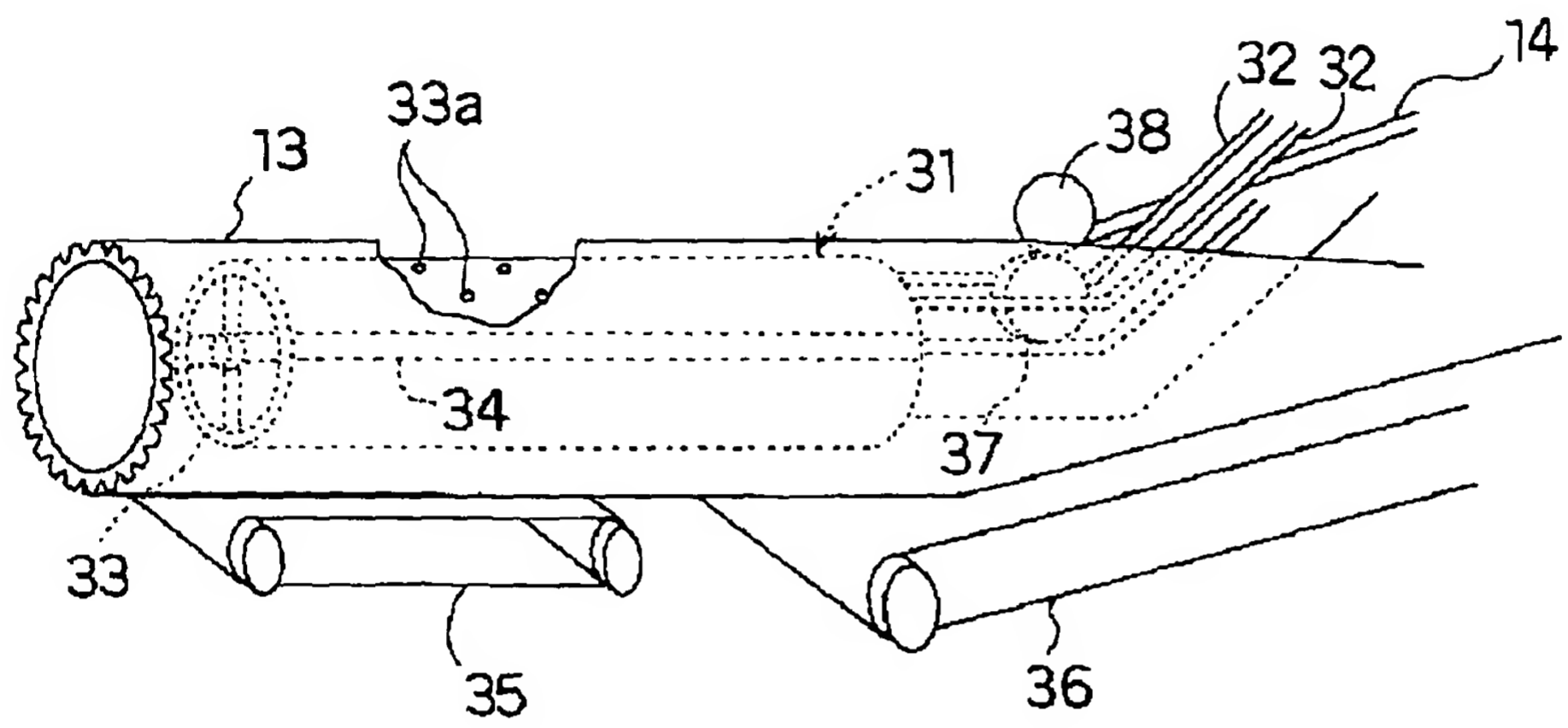
[Drawing 16]



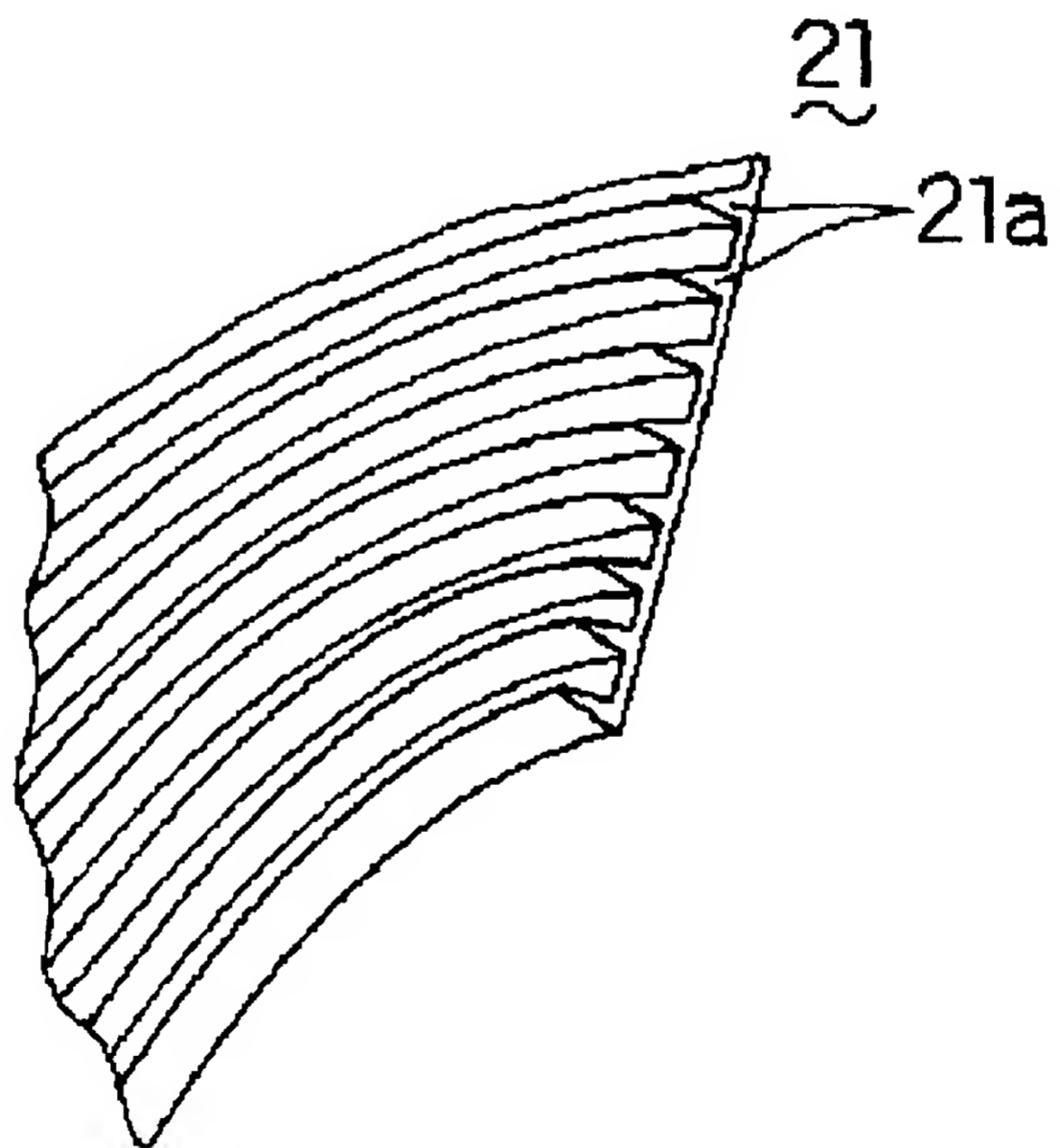
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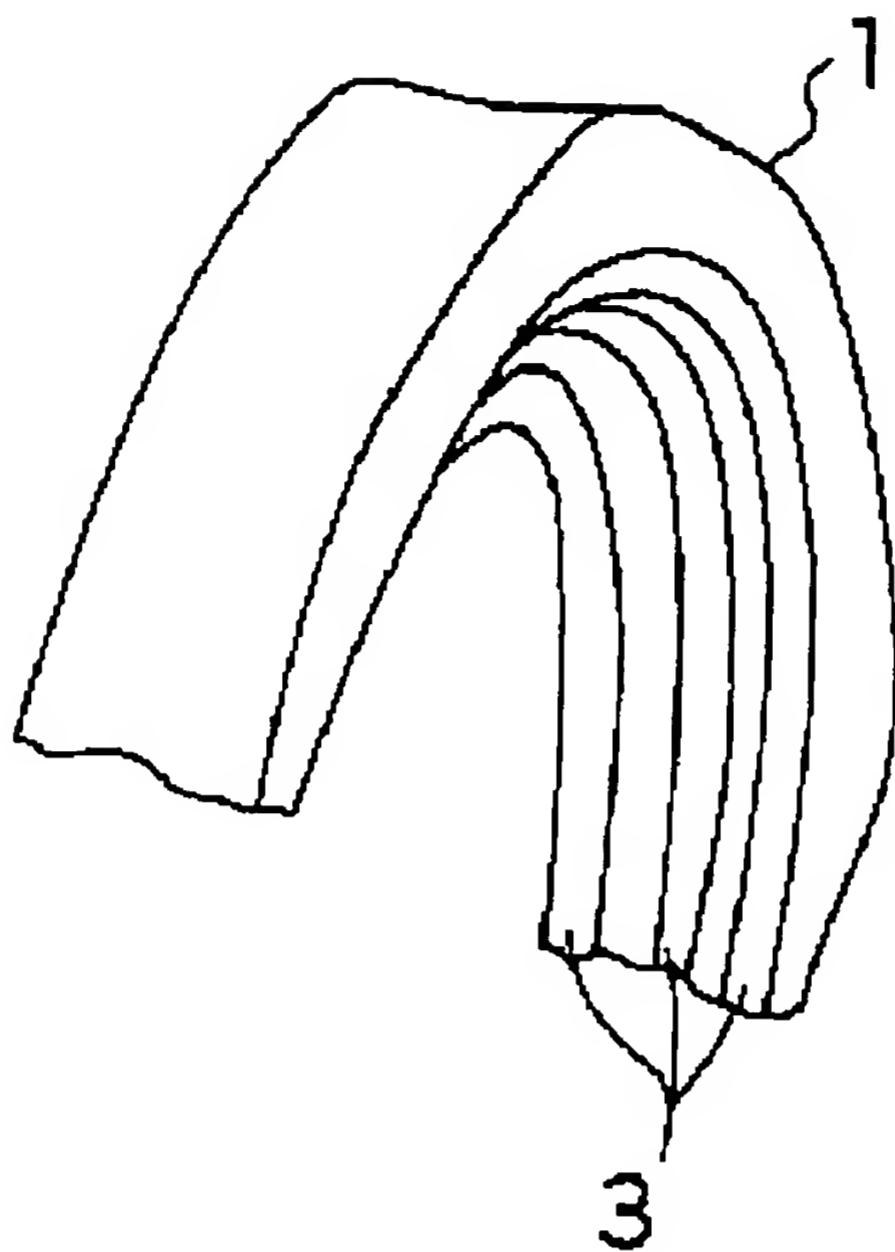
[Drawing 11]



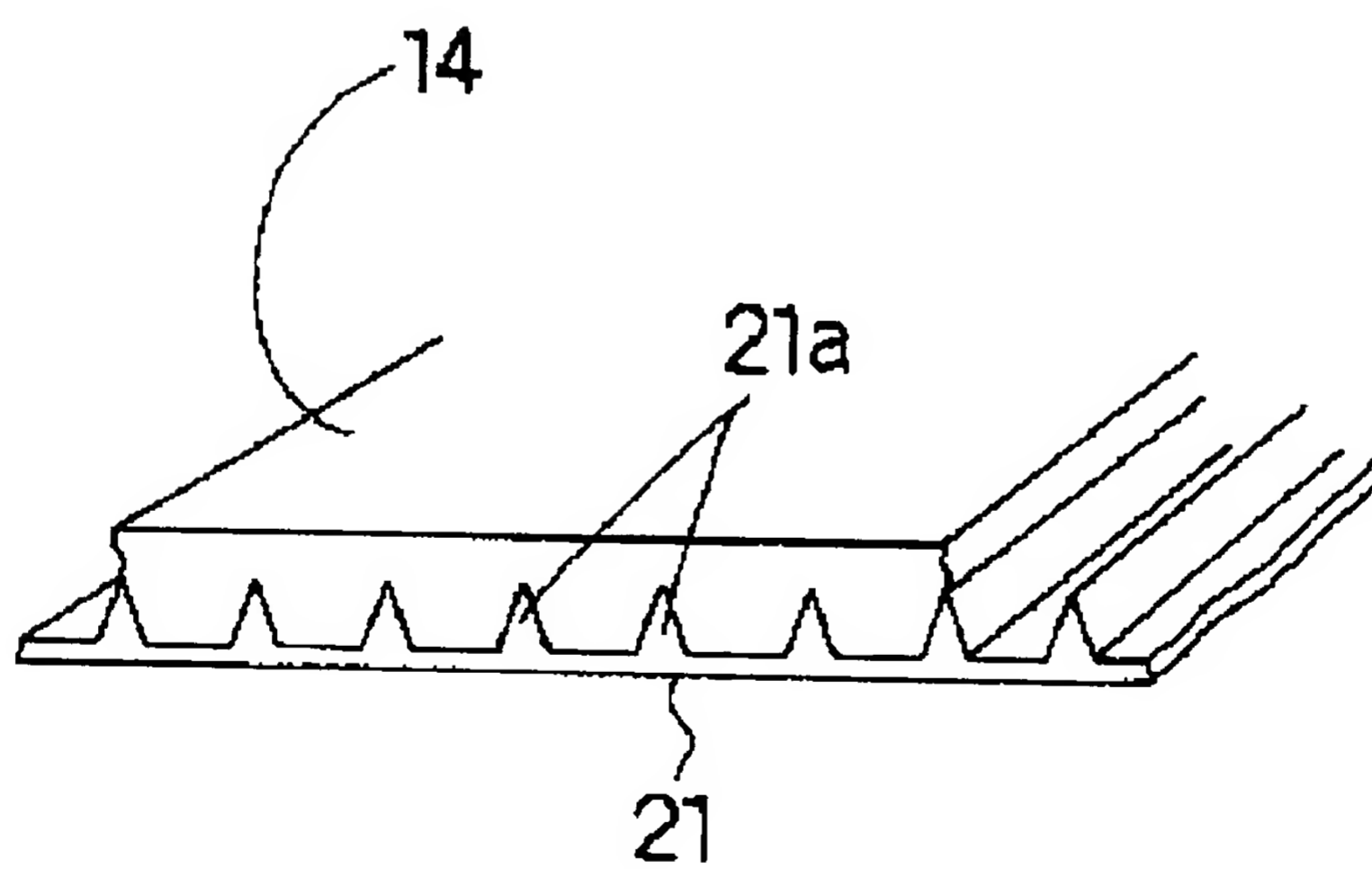
[Drawing 12]



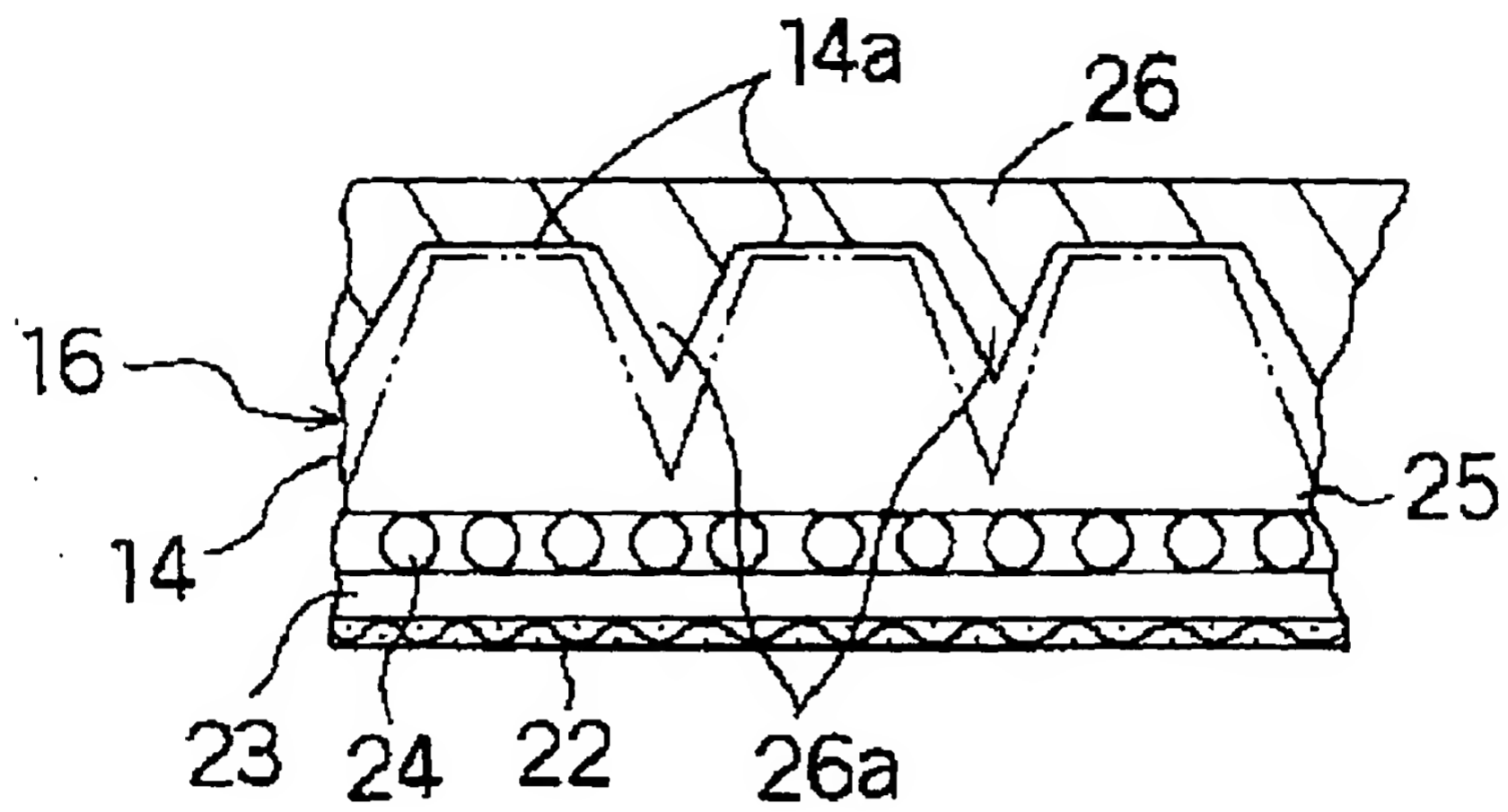
[Drawing 15]



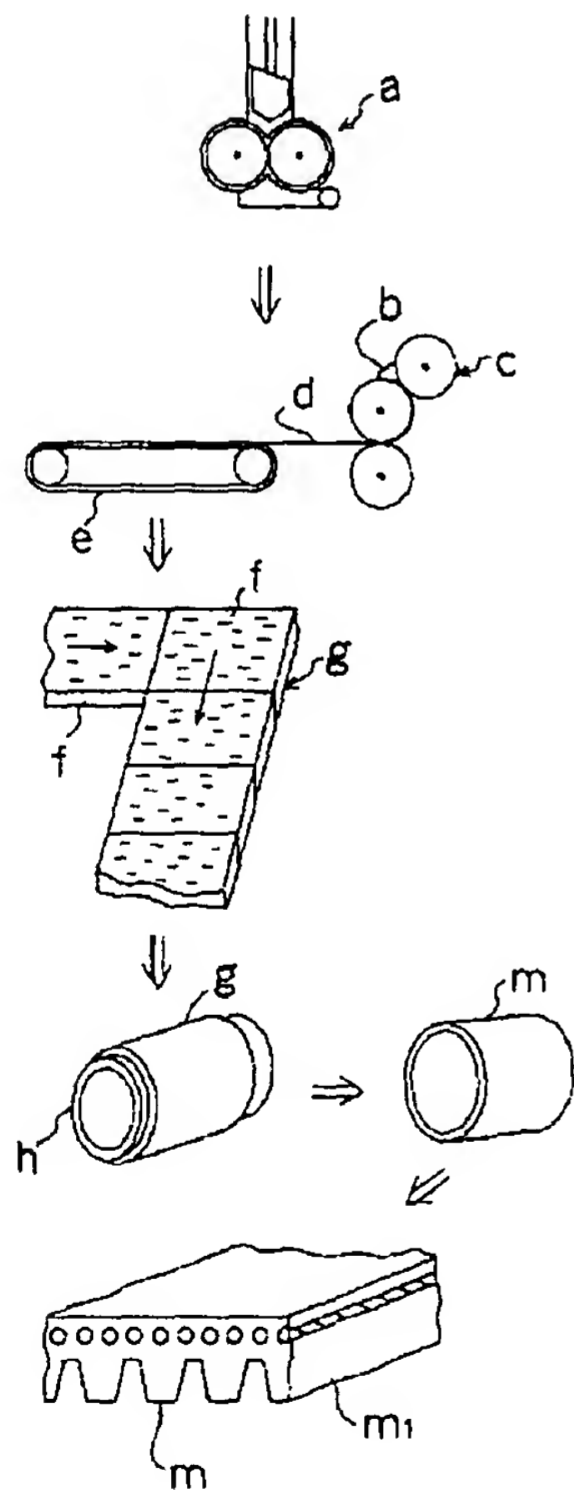
[Drawing 13]



[Drawing 14]



[Drawing 17]



[Translation done.]